3-2-06



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Number : 10/021,656

Applicant : Gary C. Johnson

Application Filed : 12-12-2001

Art unit : 3681

## REMARKS

There is no new matter contained in; neither the Summary, Substitute Description, nor the Drawing.

The substitute Description of the Invention relies on though, not necessary; MPEP-2163.07 (A), Inherent Function, Theory, or Advantage. The said Bevel Gear Differential is not from a reference but, is a part of the claimed combination.

Also, The enclosed substitute description is the Mode of Operation of; The Best Mode, see; MPEP-608.01(h) and MPEP-2165 which my original application lacked but, I was not informed of. There is not one 35 USC 112, first paragraph "objection" in six Office Actions, as informal as my original was. Therefore, it can be assumed that the disclosure was enabling from the start otherwise, the examiner would; be breaking a United States Code, according to; MPEP-2163.04 - Burden on the Examiner with Regard to the Written Description Requirement. Also, according to; MPEP-2163, section; II 3(a)-For Each Claim Drawn to a Single Embodiment or Species, a 35 USC 112, first paragraph (disclosure) "rejection" can not be made of; a single embodiment invention. It would be irrelevant to do so because; the point of a claim rejection is to set parameters of what is being claimed. The scope and range of a single embodiment (or less) invention can not affect another inventor's claim / claims. Furthermore mine is a patentable "new" combination therefore, it does not infringe upon nor can be infringed on. It has it's on contained; scope and range. Furthermore, as I have stated; more than once, it can't be assumed whether, intended or not that, one section "Heading" is intended to be placement for another section "Heading."

## REMARKS (continued)

**EXAMINERS ERRORS; first Office Action (OA) of; 1-10-03:**

**(1) Claim not drafted nor patentable matter indicated, see; MPEP-707.07(j); sec 1., then see; MPEP-401; "Examiner Note," and third page of said OA; where an Attorney is suggested.**

**(1) Claims 1-3 were unlawfully rejected under; 35 USC 102(b); see; page four; first paragraph of; this same Office Action and then see; MPEP-2173.05(j)-Old Combination.**

**(2) The applicant's description of; the invention, according to; 35 USC 111 and 35 USC 112; first paragraph, is not enabling. See; MPEP-2163, MPEP-2163.04- -"Burden on the Examiner with Regard to the Written Description Requirement." Also see; MPEP-2107, 706.03 (a) and 101, concerning; Utility. See; MPEP-608(h) concerning; "Mode of Operation of Invention."**

**(3) The examiner did not mention/indicate that, the application lacked a "Detailed Description of the Invention" as required, see; MPEP-608.01(b)(9)-Arrangement of Application and MPEP-608.01(g)-"Detailed Description of Invention." See also; 37 CFR 1.121(b)(1), concerning; heading changes/amendments and 37 CFR 1.121(b)(2) concerning; replacement sections.**

**(4) The applicant's Drawing errors were not pointed out; one of which was critical. The applicant's Drawing amendments are in accordance with; 37 CFR 1.121(d) -"Drawing Amendments" and 37 CFR 1.84(n) – Symbols; but, weren't allowed (see; fourth Office Action of 6-28-05).**
**The drawing amendments were justifiable and/or minor See; MPEP-608.02(p) – "Correction of Drawings." Some were obvious errors, see; MPEP-2163.07; sec. II. – "OBVIOUS ERRORS" and the others were backed by the; Detailed Description of the "Drawing."**

5-23-05





## DETAILED DESCRIPTION OF THE INVENTION

This invention pertains to a new vehicle differential. The new differential having these advantages :

(1) an all gear drive system,

(2) continuous drive means to each drive axle/wheel,

(3) forced / allowed ,inversely proportional rotation variability between axle sections ; only when needed,

(4) anti roll-back means of the drive wheels / axle sections on an inclined drive surface,

(5) also having dual internal driving means to each drive axle section / wheel.

The said new differential shown in the drawing, is herein described.

The housing 25, ( shown fragmented ) is the outermost support element of the said; new differential. The end plate 20, is affixed to the case 8, by bolts 28, and 30. The differential case 8; being rotatively supported,and axially supported in the said housing 25; by way of the outwardly protruding axial stock of case 8. The said new differential; being rotated by way of the crown gear 24,shaft 23, and gear 22. Gear 22; being splined to the shaft 23. Shaft 23; being rotatively supported by the housing 25. The case 9; being axially, and rotatively supported by the case 8; by way of the protruding end support stock of case 9, and the bearing 26. The case 9; being supported also, by way of bevel gear 11, and shaft 19.

The said bevel gear 11; being axially affixed/splined to the case 9. The bevel gear 11; being axially supported and rotatively supported by way of the bearing 21 and the shaft 19. The shaft 19; by way of it's end support stock 2; is axially supported and stationary to the case 8; by way of the support member 1. The support member 1 (shown with a circular invisibility line) is affixed/stationary to the case 8. Pinion shafts 3 and 4; are stationary to case 8; by way of case 8 and the said support stock 2; of shaft 19. The axle shaft 5; being entered and supported rotatively through / by the central stock of case 8, support 1, and shaft 19. The final resting place of axle shaft 5; being the central inside wall of case 9. The bevel gear 12 is splined/stationary to the axle shaft 5. The bevel gear 12; being axially and rotatively supported in the case 8; by way of the bearing 27 and the extended support stock of the said bevel gear 12. The bevel gears 13 and 14; being rotatively stationary to the case 8; by pinion shafts 3 and 4. The bevel gears 13 and 14; being in continuous engagement contact with the bevel gears 11 and 12. The axle shaft 10; being axially splined/stationary to the extended support stock of the case 9. The gear 6 is axially splined/stationary to the end of axle shaft 5. The gear 7 is axially splined to the end of shaft 19. The shafts 17 and 18 are stationary to the case 9 and parallel to the axis of the said case 9. The gears 15 and 16; have the same function / purpose.
The gear 15 is axially and rotatively stationary in the case 9; by way of shaft 17.
The gear 16 is axially and rotatively stationary in the case 9; by way of the shaft 18.
The gears 15 and 16 are orbitally engaged to the gears 6 and 7.

Wherein the said new differential is being rotated in the direction indicated in the drawing, and

(a) wherein rotation variability, between axle sections is needed; due to drive path curvature ( when referred to; axle section / sections, also includes the drive wheel , of the axle section / sections referred to ).

Wherein the axle section of axle 5, and gear 6, is rotating faster / slower than the drive case 8; due to external force. The gear/gears; 15 /16, will herein be forced to rotate inversely proportional over / around gear 7. Thus causing the axle section of axle 10, to also rotate inversely proportional; relative to the axle section, of axle 5.

~~(b) wherein the axle section of axle 10, has complete traction, and complete rotation resistance, and the axle section of axle 5; having neither. The axle section of axle 10; being / beginning at 0 rpm.~~

~~The said new differential is designed to automatically go into a gear locking effect / mode. The above said axle section, of axle 10; being / beginning at 0 rpm. Herein; the gear / gears 15 /16, being stationarily rotative. Therefore the gears 7, 6, and 12, are caused / forced to rotate at the same rpm as the drive case 8. Thus preventing rotation of the gear / gears 13 /14, on their respective shafts 3 /4. Therein also preventing the independent rotation ability of gear 11, and it's axle section / axle 10. Herein both axle sections, are forced to rotate at the same speed as case 8.~~

(c) wherein the axle section of axle 5, has complete traction, and complete rotation resistance; and the axle section of axle 10, having neither. Herein the axle section of axle 5; being / beginning at 0 rpm .

In the above said circumstance, the said; new differential is designed to automatically go into a gear-locking effect / mode. Whereas gear 6, of axle 5, is also at 0 rpm. Herein the gear 7; of shaft 19, and drive case 8, will try to rotate the case 9, by way of the gear / gears 15 /16; but in an opposing direction to that of drive case 8. Whereas gear 12, of axle 5, is also at 0 rpm; the gear / gears 13 /14 , will try to rotate the case 9, by way of gear 11; but in the same direction as the drive case 8.

Herein, two different drive forces / members are acting on the same driven member; and at the same time. Hereby causing the afore said; gear-locking effect / mode.

Each axle section ; hereby is forced to rotate at the same rpm as the other axle section, and the case 8.

(d) wherein traction is lost by one of either axle section; on an inclined drive surface. Herein a situation called; " vehicle roll-back " could occur.

The afore mentioned gear-locking effects / modes; will prevent loss of momentum of the axle section that has traction. This said new differential is designed; and the axle sections integrated in such a way; that equaled drive rotation resistance is caused; one axle section to the other.

Safety is an inherent advantage of the said; new (p.a.c.t.) differential. "Fish-tailing"; due to sudden drive surface traction of an over accelerated drive wheel, is preventable.

5-23-05





## DETAILED DESCRIPTION OF THE INVENTION

~~This invention pertains to a new vehicle differential. The new differential having these advantages :~~

~~(1) an all gear drive system,~~

~~(2) continuous drive means to each drive axle/wheel,~~

~~(3) forced / allowed ,inversely proportional rotation variability between axle sections ; only when needed,~~

~~(4) anti roll-back means of the drive wheels / axle sections on an inclined drive surface,~~

~~(5) also having dual internal driving means to each drive axle section / wheel.~~

~~The said new differential shown in the drawing, is herein described.~~

~~The housing 25, ( shown fragmented ) is the outermost support element of the said; new differential. The end plate 20, is affixed to the case 8, by bolts 28, and 30.~~

~~The differential case 8; being rotatively supported,and axially supported in the said housing 25; by way of the outwardly protruding axial stock of case 8. The said new differential; being rotated by way of the crown gear 24,shaft 23, and gear 22.~~

~~Gear 22; being splined to the shaft 23. Shaft 23; being rotatively supported by the housing 25. The case 9; being axially, and rotatively supported by the case 8; by way of the protruding end support stock of case 9, and the bearing 26. The case 9; being supported also, by way of bevel gear 11, and shaft 19.~~

The said bevel gear 11; being axially affixed/splined to the case 9. The bevel gear 11; being axially supported and rotatively supported by way of the bearing 21 and the shaft 19. The shaft 19; by way of it's end support stock 2; is axially supported and stationary to the case 8; by way of the support member 1. The support member 1 (shown with a circular invisibility line) is affixed/stationary to the case 8. Pinion shafts 3 and 4; are stationary to case 8; by way of case 8 and the said support stock 2; of shaft 19. The axle shaft 5; being entered and supported rotatively through / by the central stock of case 8, support 1, and shaft 19. The final resting place of axle shaft 5; being the central inside wall of case 9. The bevel gear 12 is splined/stationary to the axle shaft 5. The bevel gear 12; being axially and rotatively supported in the case 8; by way of the bearing 27 and the extended support stock of the said bevel gear 12. The bevel gears 13 and 14; being rotatively stationary to the case 8; by pinion shafts 3 and 4. The bevel gears 13 and 14; being in continuous engagement contact with the bevel gears 11 and 12. The axle shaft 10; being axially splined/stationary to the extended support stock of the case 9. The gear 6 is axially splined/stationary to the end of axle shaft 5. The gear 7 is axially splined to the end of shaft 19. The shafts 17 and 18 are stationary to the case 9 and parallel to the axis of the said case 9. The gears 15 and 16; have the same function / purpose. The gear 15 is axially and rotatively stationary in the case 9; by way of shaft 17. The gear 16 is axially and rotatively stationary in the case 9; by way of the shaft 18. The gears 15 and 16 are orbitally engaged to the gears 6 and 7.

Wherein the said new differential is being rotated in the direction indicated in the drawing, and

(a) wherein rotation variability, between axle sections is needed; due to drive path curvature ( when referred to; axle section / sections, also includes the drive wheel , of the axle section / sections referred to ).

Wherein the axle section of axle 5; and gear 6, is rotating faster / slower than the drive case 8; due to external force. The gear/gears; 15 /16, will herein be forced to rotate inversely proportional over / around gear 7. Thus causing the axle section of axle 10, to also rotate inversely proportional; relative to the axle section, of axle 5.

~~(b) wherein the axle section of axle 10, has complete traction, and complete rotation resistance, and the axle section of axle 5; having neither. The axle section of axle 10; being / beginning at 0 rpm.~~

~~The said new differential is designed to automatically go into a gear locking effect / mode. The above said axle section, of axle 10; being / beginning at 0 rpm. Herein; the gear / gears 15 /16; being stationarily rotative. Therefore the gears 7, 6, and 12, are caused / forced to rotate at the same rpm as the drive case 8. Thus preventing rotation of the gear / gears 13 /14, on their respective shafts 3 /4. Therein also preventing the independent rotation ability of gear 11, and it's axle section / axle 10. Herein both axle sections, are forced to rotate at the same speed as case 8.~~

~~(c) wherein the axle section of axle 5, has complete traction, and complete rotation resistance; and the axle section of axle 10, having neither. Herein the axle section of axle 5; being / beginning at 0 rpm .~~

~~In the above said circumstance, the said; new differential is designed to automatically go into a gear-locking effect / mode. Whereas gear 6, of axle 5, is also at 0 rpm. Herein the gear 7; of shaft 19, and drive case 8, will try to rotate the case 9, by way of the gear / gears 15 /16; but in an opposing direction to that of drive case 8. Whereas gear 12, of axle 5, is also at 0 rpm; the gear / gears 13 /14 , will try to rotate the case 9, by way of gear 11; but in the same direction as the drive case 8.~~

~~Herein, two different drive forces / members are acting on the same driven member; and at the same time. Hereby causing the afore said; gear-locking effect / mode.~~

~~Each axle section ; hereby is forced to rotate at the same rpm as the other axle section, and the case 8.~~

~~(d) wherein traction is lost by one of either axle section; on an inclined drive surface. Herein a situation called; " vehicle roll-back " could occur.~~

~~The afore mentioned gear-locking effects / modes; will prevent loss of momentum of the axle section that has traction. This said new differential is designed; and the axle sections integrated in such a way; that equaled drive rotation resistance is caused; one axle section to the other.~~

~~Safety is an inherent advantage of the said; new (p.a.c.t.) differential.~~

~~"Fish-tailing"; due to sudden drive surface traction of an over accelerated drive wheel,~~ is preventable.

3-2-06

(AMENDMENT - C)

## DETAILED DESCRIPTION OF THE INVENTION

NOTE : In this Description; axle / axle section(s) when referred to includes; the drive wheel(s).

NOTE : In the claims, case 9 is referred to as; the planetary gear carrier.

IN THE DRAWING; the hollow intermediate shaft 19 is supported by support member 1 and support stock 2. The said intermediate shaft is stationary to case 8. Pinion shafts 3 and 4 are supported by said support stock 2 and said case 8. The axle shaft 5 has a gear 6 fixed / spllined to it's end . The gear 7 is stationary to the case 8 being; fixed / splined to the said hollow intermediate shaft 19. The planetary gear carrier 9 having axle shaft 10 fixed / splined to one of it's axial openings and the said planetary gear carrier 9 having bevel gear 11 fixed / splined to it's other end. Bevel gear 12 is fixed / splined to axle shaft 5. The pinion gears 13 and 14 are rotatively stationary in the case 8. The orbital gears 15 and 16 are stationary in the said planetary gear carrier 9 by way of shafts 17 and 18. The member 29 is a flat bearing.

INHERENT PROPERTIES of; a "Bevel Gear Differential" / and it's drive axle sections when the vehicle / said differential is driven, are:

(1) The said differential allows inversely proportional rotation / reciprocal motion variability of it's axle sections relative to the rpm of its drive case.

(2) The said differential rotates both axle sections in the same direction when, driven; unless predisposed otherwise due to; external force as in; a vehicle roll-back condition of the vehicle on an inclined surface.

(3) When, one of either axle sections of the said differential is / becomes completely immobile, it's opposing axle section will rotate at twice the rpm as the differential drive case.

(4) The said differential will rotate both of it's axle sections equally when, both axle sections have equal resistance to being rotated but, but allowing variability due to; external force. However, the said differential will always rotate which ever axle section is easiest to rotate.

(5) On an inclined surface, the said differential can't prevent one of either of it's drive wheels / axles from rotating backwards when, an opposing drive wheel loses sufficient traction.

(Detailed Description of the Invention - continued)

REFERRING TO THE DRAWING:

A bevel gear / planetary gear differential is incorporated / combined with a new type of; planetary gear. The said new planetary gear having, reverse drive capabilities.

Herein, the said combination differential is rotated towards the top of the said drawing.

Wherein, if one of either axle section were to resist mobility; herein one of either gears 6 or 7 will; attempt to rotate faster than the other thus, attempting to counter rotate gears 15 and 16, case 9, and axle 10. However, the incorporation of the said two planetary gears prevents immobility of both drive wheels / axle sections but, still allows inversely proportional variability.

Wherein, the drive wheel of; axle 10, case 9 and bevel gear 11, were to become / resist mobility due to; a sufficient loss of traction of the opposing drive wheel / axle section of; axle 5. As in; the afore mentioned inherent double rotation of one of either drive wheels / axle sections of; a bevel gear differential when, it's opposing drive wheel / axle section loses traction herein, bevel gear 12, axle 5, and gear 6 would also be; caused to double rotate. However, as afore mentioned; if either gear 6 or gear 7 were to rotate faster than the other then, the case 9 would be forced to rotate also but, counter to the direction of the case 8, intermediate shaft 19, and gear 7. However, "for every action there is an equal but, opposite reaction." Drive axle 5 can't rotate without counter rotating axle 10. Herein, both drive wheels must rotate together, due to; equalized resistance to rotation.

Wherein, the drive wheel of; axle 5, gear 6, and bevel gear 12 were, to become / resist forward mobility. The pinion gears 13 and 14; will attempt to rotate the opposing bevel gear 11, and case 9, and drive axle 10 in the same direction as case 8. However, gear 7 being; stationary to case 8 will; attempt to counter rotate gears 15 and 16 over / around gear 6 thus, attempting to counter rotate bevel gear 11 but, in an opposing direction to the afore said attempted direction of bevel gear 11 and case 8. Herein, both drive wheels / axle sections are forced to rotate together.

Wherein, axle 5 and gear 6 were to rotate either; faster or slower than the case 8. Herein, the gears 15 and 16 will be forced to rotate inversely proportional over / around gear 7, thus causing; inversely proportional rotation of case 9 and axle 10; relative to axle 5.